Wiring Diagrams

Micro800™ Non-isolated Thermocouple Plug-in Module

Catalog Number 2080-TC2

http://literature.rockwellautomation.com	
FR	Cette publication est disponible en français sous forme électronique (fichier PDF). Pour la télécharger, rendez-vous sur la page Internet indiquée ci-dessus.
IT	Questa pubblicazione è disponibile in Italiano in formato PDF. Per scaricarla collegarsi al sito Web indicato sopra.
DE	Diese Publikation ist als PDF auf Deutsch verfügbar. Gehen Sie auf die oben genannte Web-Adresse, um nach der Publikation zu suchen und sie herunterzuladen.
ES	Esta publicación está disponible en español como PDF. Diríjase a la dirección web indicada arriba para buscar y descarga esta publicación.
PT	Esta publicação está disponível em português como PDF. Vá ao endereço web que aparece acima para encontrar e fazer download da publicação.
ZH	本出版物备有中文PDF格式文件， 可从上面的网址找到并下载本出版物。
ZC	本出版物備有中文PDF檔，可由上列網址下載。
KO	본 간행물은 한글판 PDF 파일로 준비되어 있습니다. 위에 있는 웹 사이트에 가셔서 간행물을 다운로드 하십시오.

Environment and Enclosure

ATTENTION

This equipment is intended for use in a Pollution Degree 2 industrial environment, in overvoltage Category II applications (as defined in IEC 60664-1), at altitudes up to 2000 m (6562 ft) without derating. This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbances.

This equipment is supplied as open-type equipment. It must be mounted within an enclosure that is suitably designed for those specific environmental conditions that will be present and appropriately designed to prevent personal injury resulting from accessibility to live parts. The enclosure must have suitable flame-retardant properties to prevent or minimize the spread of flame, complying with a flame spread rating of 5V A, V2, V1, V0 (or equivalent) if non-metallic. The interior of the enclosure must be accessible only by the use of a tool. Subsequent sections of this publication may contain additional information regarding specific enclosure type ratings that are required to comply with certain product safety certifications.

In addition to this publication, see:

- Industrial Automation Wiring and Grounding Guidelines, Rockwell Automation publication 1770-4.1, for additional installation requirements.
- NEMA Standard 250 and IEC 60529, as applicable, for explanations of the degrees of protection provided by different types of enclosure.

Preventing Electrostatic Discharge

ATTENTION

This equipment is sensitive to electrostatic discharge, which can cause internal damage and affect normal operation. Follow these guidelines when you handle this equipment:

- Touch a grounded object to discharge potential static.
- Wear an approved grounding wriststrap.
- Do not touch connectors or pins on component boards.
- Do not touch circuit components inside the equipment.
- Use a static-safe workstation, if available.
- Store the equipment in appropriate static-safe packaging when not in use.

North American Hazardous Location Approval

The following modules are North American Hazardous Location approved:
2080-TC2

The following information applies when operating this equipment in hazardous locations:	**Informations sur l'utilisation de cet équipement en environnements dangereux:**
Products marked "CL I, DIV 2, GP A, B, C, D" are suitable for use in Class I Division 2 Groups A, B, C, D, Hazardous Locations and nonhazardous locations only. Each product is supplied with markings on the rating nameplate indicating the hazardous location temperature code. When combining products within a system, the most adverse temperature code (lowest "T" number) may be used to help determine the overall temperature code of the system. Combinations of equipment in your system are subject to investigation by the local Authority Having Jurisdiction at the time of installation.	Les produits marqués "CL I, DIV 2, GP A, B, C, D" ne conviennent qu'à une utilisation en environnements de Classe I Division 2 Groupes A, B, C, D dangereux et non dangereux. Chaque produit est livré avec des marquages sur sa plaque d'identification qui indiquent le code de température pour les environnements dangereux. Lorsque plusieurs produits sont combinés dans un système, le code de température le plus défavorable (code de température le plus faible) peut être utilisé pour déterminer le code de température global du système. Les combinaisons d'équipements dans le système sont sujettes à inspection par les autorités locales qualifiées au moment de l'installation.

WARNING

EXPLOSION HAZARD

- Do not disconnect equipment unless power has been removed or the area is known to be nonhazardous.
- Do not disconnect connections to this equipment unless power has been removed or the area is known to be nonhazardous. Secure any external connections that mate to this equipment by using screws, sliding latches, threaded connectors, or other means provided with this product.
- Substitution of any component may impair suitability for Class I, Division 2.
- If this product contains batteries, they must only be changed in an area known to be nonhazardous.

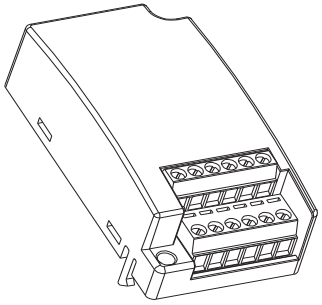
AVERTISSEMENT

RISQUE D'EXPLOSION

- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher l'équipement.
- Couper le courant ou s'assurer que l'environnement est classé non dangereux avant de débrancher les connecteurs. Fixer tous les connecteurs externes reliés à cet équipement à l'aide de vis, loquets coulissants, connecteurs filetés ou autres moyens fournis avec ce produit.
- La substitution de tout composant peut rendre cet équipement inadapté à une utilisation en environnement de Classe I, Division 2.
- S'assurer que l'environnement est classé non dangereux avant de changer les piles.

Parts List

Your package contains one Micro800 Non-isolated Thermocouple plug-in module, two module fastening screws, one trimmed/formed bendable lead NTC thermistor and these pin out guide wiring instructions.



45010

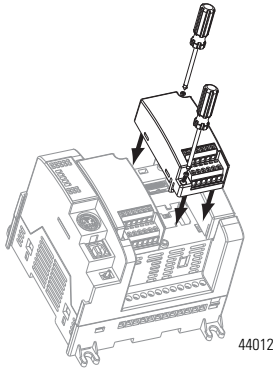
You can choose to wire the plug-in before inserting it onto the controller, or wire it once the module is secured in place.

ATTENTION

- This equipment is considered Group 1, Class A industrial equipment according to IEC/CISPR 11. Without appropriate precautions, there may be difficulties with electromagnetic compatibility in residential and other environments due to conducted and radiated disturbance.
- Be careful when stripping wires. Wire fragments that fall into the controller could cause damage. Once wiring is complete, make sure the controller is free of all metal fragments.
- Do not wire more than 2 conductors on any single terminal.
- If you insert or remove the plug-in module while power is on, an electrical arc can occur. This could cause an explosion in hazardous location installations. Be sure that power is removed or the area is nonhazardous before proceeding.
- Use shielded twisted core cables to connect the sensor.
- The shield should be grounded only at controller end.
- Connect the thermocouples directly to the module.
- Do not insert or remove the plug-in module while power is applied, otherwise, permanent damage to equipment may occur.

Insert Module into Controller

Follow the instructions to insert and secure the plug-in module to the controller.



ATTENTION

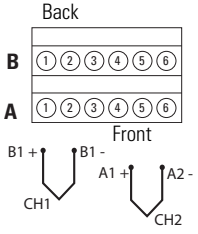
This plug-in module is intended for use with Micro800 Family of Programmable Controllers.

1. Position the plug-in module with the terminal block facing the front of the controller as shown.
2. Snap the module into the module bay.
3. Using a screwdriver, tighten the 10…12 mm (0.39…0.47 in.) M3 self tapping screw to torque specifications.

Wire the Module

Follow the pinout diagram to wire your plug-in module.

12-Pin Female Terminal Block

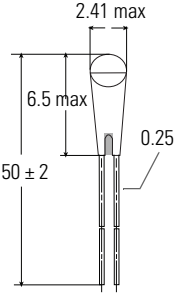


(View into terminal block)

Pin A1 CH0+	Pin B1 CH1+
Pin A2 CH0-	Pin B2 CH1-
Pin A3 CJ+	Pin B3 CJ-
Pin A4 No connection	Pin B4 No connection
Pin A5 No connection	Pin B5 No connection
Pin A6 No connection	Pin B6 No connection

Type of CJC Sensor

The CJC sensor is a non-polarized, passive negative temperature co-efficient thermistor (EPCOS B57869S0502F140). It is readily available in the market with most third party suppliers/vendors.



Types of Thermocouple Sensors Supported

The module supports thermocouple sensors J, K, N, T, E, R, S, and B. The following table shows the thermocouple color codes for identification.

Thermocouple Color Codes

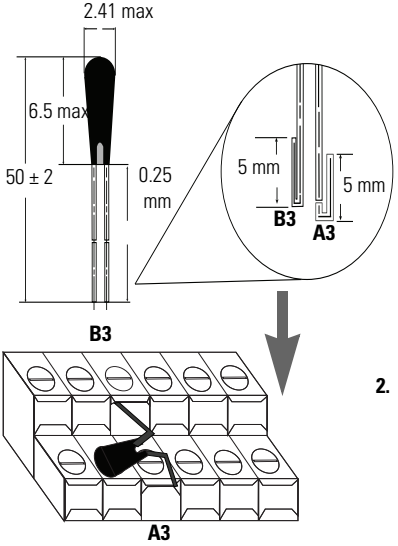
ANSI Code	ANSI MC 96.1 Color Code		Alloy Combination		Max T/C Grade	EMF (mV) Over Max	IEC 584.3 Color Coding		IEC Code
	T/C Grade	Extension Grade	+Lead	-Lead	Temp Range	Temp Range	T/C Grade	Intrinsi-cally Safe	
J	+White -Red	+White -Red	IRON Fe (magnetic)	Constantan Copper-Nickel Cu-Ni	-210… 1200 °C -346… 2193 °F	-6.095… 59.563	+Black -White	+Black -White	J

Thermocouple Color Codes

ANSI Code	ANSI MC 96.1 Color Code		Alloy Combination		Max T/C Grade	EMF (mV) Over Max	IEC 584.3 Color Coding		IEC Code
	T/C Grade	Extension Grade	+Lead	-Lead	Temp Range	Temp Range	T/C Grade	Intrinsi-cally Safe	
K	+Yellow -Red	+Yellow -Red	Chromega Nickel-Chromium Ni-Cr	Alomega Nickel Aluminum Ni-Al (magnetic)	-270… 1372 °C -454… 2501 °F	-6.458… 54.886	+Green -White	+Green -White	K
T	+Blue -Red	+Blue -Red	Copper Cu	Constantan Copper-Nickel Cu-Ni	-270… 400 °C -454… 752 °F	-6.258… 20.872	+Brown -White	+Brown -White	T
E	+Purple -Red	+Purple -Red	Chromega Nickel-Chromium Ni-Cr	Constantan Copper-Nickel Cu-Ni	-270… 1000 °C -454… 1832 °F	-9.835… 76.373	+Purple -White	+Purple -White	E
N	+Orange -Red	+Orange -Red	Omega-P Nicrosil Ni-Cr-Si	Omega-N Nisil Ni-Si-Mg	-270… 1300 °C -450… 2372 °F	-4.345… 47.513	+Pink -White	+Pink -White	N
R	None Established	+Black -Red	Platinum-13% Rhodium Pt-13% Rh	Platinum Pt	-50… 1768 °C -58… 3214 °F	-0.226… 21.101	+Orange -White	+Orange -White	R
S	None Established	+Black -Red	Platinum-10% Rhodium Pt-10% Rh	Platinum Pt	-50… 1768 °C -58… 3214 °F	-0.236… 18.693	+Orange -White	+Orange -White	S
B	None Established	+Gray -Red	Platinum-30% Rhodium Pt-30% Rh	Platinum-6% Rhodium Pt-6% Rh	0… 1820 °C 32… 3308 °F	0… 13.820	+Gray -White	+Gray -White	B

Wire the CJC Thermistor

2080-TC2 CJC Thermistor Wiring and Mounting Guide



1. Connect the thermocouples to channel 0 and 1, respectively. Then, connect and screw the thermistor to terminals A3 and B3.

2. Once fitted, bend the black bead of the thermistor such that it makes contact with the A2 screw securely.

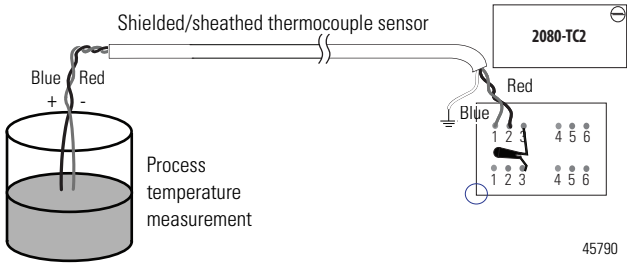
The position for the thermistor, as illustrated, helps to compensate for thermoelectric voltages developed at screw junction equally for thermocouples connected to channels 0 and 1. If the bead is not in proper contact with the screw, there will be deviation in readings due to inadequate isothermal compensation.

This sensor is passive, non-polarized and readily available in the market.

Wire the Module in the Field

Connect the thermocouple sensors directly to the module terminals. If a separate cable is used to connect the thermocouple to the module, the CJC thermistor has to be mounted to the cable at thermocouple junction only.

Direct sensor wiring



ATTENTION

Direct wiring is the preferred method of wiring for thermocouples.

Specifications

General and Environmental Specifications

Attribute	Value
Mounting torque	0.2 Nm (1.48 lb-in.)
Terminal screw torque	0.22…0.25 Nm (1.95…2.21 lb-in.) using a 2.5 mm [0.10 in.] flat-blade screwdriver
Wire size	0.14…1.5 mm^2 (26…16 AWG) solid copper wire or 0.14…1.0 mm^2 (26…17 AWG) stranded copper wire rated @ 90 °C (194 °F) insulation max
Input impedance	> 300 KΩ
Common mode rejection ratio	100 dB @ 50/60 Hz
Normal mode rejection ratio	70 dB @ 50/60 Hz
Resolution	14-bit

General and Environmental Specifications

Attribute	Value
Accuracy	±1.0 °C for TC @ 25 °C (77 °F) For more information, see the Micro830 Programmable Controllers User Manual, publication 2080-UM002.
Channels	2, non-isolated
Thermocouple types supported	J,K,N,T,E,R,S,B
Open-circuit detection time	8…1515 ms
Power consumption	3.3 V, 40 mA
Temperature, operating	IEC60068-2-1 (Test Ad, Operating Cold), IEC60068-2-2, (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -20...65 °C (-4…149 °F)
Temperature, surrounding air, max.	65 °C (149 °F)
Temperature, non-operating	IEC60068-2-1 (Test Ad, Operating Cold), IEC60068-2-2, (Test Bd, Operating Dry Heat), IEC 60068-2-14 (Test Nb, Operating Thermal Shock): -40...85 °C (-40…185 °F)
North American temp code	T4

Certifications

Certification (when product is marked)(1)	Value
c-UL-us	UL Listed Industrial Control Equipment, certified for US and Canada. See UL File E322657. UL Listed for Class I, Division 2 Group A,B,C,D Hazardous Locations, certified for U.S. and Canada. See UL File E334470.
CE	European Union 2004/108/EC EMC Directive, compliant with: EN 61326-1; Meas./Control/Lab., Industrial Requirements EN 61000-6-2; Industrial Immunity EN 61000-6-4; Industrial Emissions EN 61131-2; Programmable Controllers (Clause 8, Zone A & B)
C-Tick	Australian Radiocommunications Act, compliant with: AS/NZS CISPR 11; Industrial Emissions

(1) See the Product Certification link at http://www.ab.com for Declarations of Conformity, Certificates, and other certification details.

Notes:

Rockwell Automation Support

Rockwell Automation provides technical information on the Web to assist you in using its products. At http://www.rockwellautomation.com/support/, you can find technical manuals, a knowledge base of FAQs, technical and application notes, sample code and links to software service packs, and a MySupport feature that you can customize to make the best use of these tools.

For an additional level of technical phone support for installation, configuration and troubleshooting, we offer TechConnect support programs. For more information, contact your local distributor or Rockwell Automation representative, or visit http://www.rockwellautomation.com/support/.

Installation Assistance

If you experience a problem within the first 24 hours of installation, please review the information that's contained in this manual. You can also contact a special Customer Support number for initial help in getting your product up and running.

United States or Canada	1.440.646.3434
Outside United States or Canada	Use the Worldwide Locator at http://www.rockwellautomation.com/support/americas/phone_en.html, or contact your local Rockwell Automation representative.

New Product Satisfaction Return

Rockwell Automation tests all of its products to ensure that they are fully operational when shipped from the manufacturing facility. However, if your product is not functioning and needs to be returned, follow these procedures.

United States	Contact your distributor. You must provide a Customer Support case number (call the phone number above to obtain one) to your distributor to complete the return process.
Outside United States	Please contact your local Rockwell Automation representative for the return procedure.

Documentation Feedback

Your comments will help us serve your documentation needs better. If you have any suggestions on how to improve this document, complete this form, publication RA-DU002, available at http://www.rockwellautomation.com/literature/.

Allen-Bradley, Rockwell Automation, MicroLogix, and TechConnect are trademarks of Rockwell Automation, Inc.

Trademarks not belonging to Rockwell Automation are property of their respective companies.

Rockwell Otomasyon Ticaret A.Ş., Kar Plaza İş Merkezi E Blok Kat:6 34752 İçerenköy, İstanbul, Tel: +90 (216) 5698400

www.rockwellautomation.com

Power, Control and Information Solutions Headquarters

Americas: Rockwell Automation, 1201 South Second Street, Milwaukee, WI 53204-2496 USA, Tel: (1) 414.382.2000, Fax: (1) 414.382.4444
Europe/Middle East/Africa: Rockwell Automation, Vorstlaan/Boulevard du Souverain 36, 1170 Brussels, Belgium, Tel: (32) 2 663 0600, Fax: (32) 2 663 0640
Asia Pacific: Rockwell Automation, Level 14, Core F, Cyberport 3, 100 Cyberport Road, Hong Kong, Tel: (852) 2887 4788, Fax: (852) 2508 1846

Publication 2080-WD006A-EN-P - September 2011 PN 953203-26(01)

Copyright © 2011 Rockwell Automation, Inc. All rights reserved.